Space Weather Forecast

Issued on Wednesday, 13 September 2023 at 01:24 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Further Moderate-class flares likely (R1-R2 radio blackouts). Slight Chance of G1-G2 Minor storms throughout given likely faster solar wind influence.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Moderate activity, with two Moderate flares observed in the last 24 hours. The strongest of these from the larger spot in the west at 12/0707 UTC. There are seven active regions visible on the disk. The spot in the western hemisphere remains the largest spot on the disc, but has shown little recent development and remains magnetically simple. There are a number of more or less magnetically complicated regions consisting of multiple smaller spots across the disk. All of these region producing some level of flare activity and add to what is a fairly active disk. The remaining regions on the disc are simpler and largely inactive.

No Earth directed CMEs observed during the past 24hrs.

Solar Wind / Geomagnetic Activity: Solar winds were slow-ambient at first around 360-380km/s, but rose sharply from approximately 12/1120 UTC to slightly elevated levels around 400-420km/s with the arrival of a CME before falling erratically back to generally slow levels from around 12/1430 UTC. The Interplanetary Magnetic Field (IMF), Bt, was weak initially, but rose sharply to moderate to strong levels with the arrival of the CME, peaking at approximately 12/1400UTC before slowly declining to moderate levels. The north-south component, Bz, was weakly positive initially, but became moderately negative (southward) with the arrival of the CME and strongly negative for a time before slowly rising to more weakly negative levels. Geomagnetic activity was Quiet (Kp 1-2) initially, but rose to give G1 Minor Storm (Kp 5) conditions on the 12-1500UTC and 15-1800UTC intervals, and remains at unsettled to active levels (Kp 3-4).

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) persisted at background with no solar radiation storms observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is expected to be generally Moderate, with further isolated Moderate flares likely, a slight chance of isolated Strong flares.

Solar Wind / Geomagnetic Activity: There is one Earth-directed CME in the forecast as mentioned above. This may give Earth a weak glancing blow possibly later on Day 3 (15 Sep). Recent unexpected CME influence appears to be waning with a return to a more ambient regime expected at least in the short term. Faster solar winds expected into the forecast period however, with some coronal hole fast wind influence expected through Day 1 into Day 2 (13-14 Sep) and an increase in winds to slightly elevated to elevated levels (450-550km/s) likely. Into Day 3 or more likely Day 4 (15-16 Sep) some connection to another fast wind stream currently

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near centre disk is likely. This features was perhaps the source of some strong solar winds (around 600km/s) on the last solar rotation, with a chance that winds may reach these levels by the end of the period.

This creates a complex forecast, with a variety of potential interactions, and low forecast confidence. Overall, largely Unsettled to Active (Kp3-4) geomagnetic activity is forecast, with a continuing slight chance of G1-G2 Minor Storm intervals.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) is forecast to persist at background with no solar radiation storms occurring.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	20	20	20	20
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	60	60	60	60
Very Active	R3 to R5 X	No	5	5	5	5

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	10	10	10	10
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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